Background Information

for public consultation on the

South Saskatchewan River Basin

DRAFT Water Management Plan

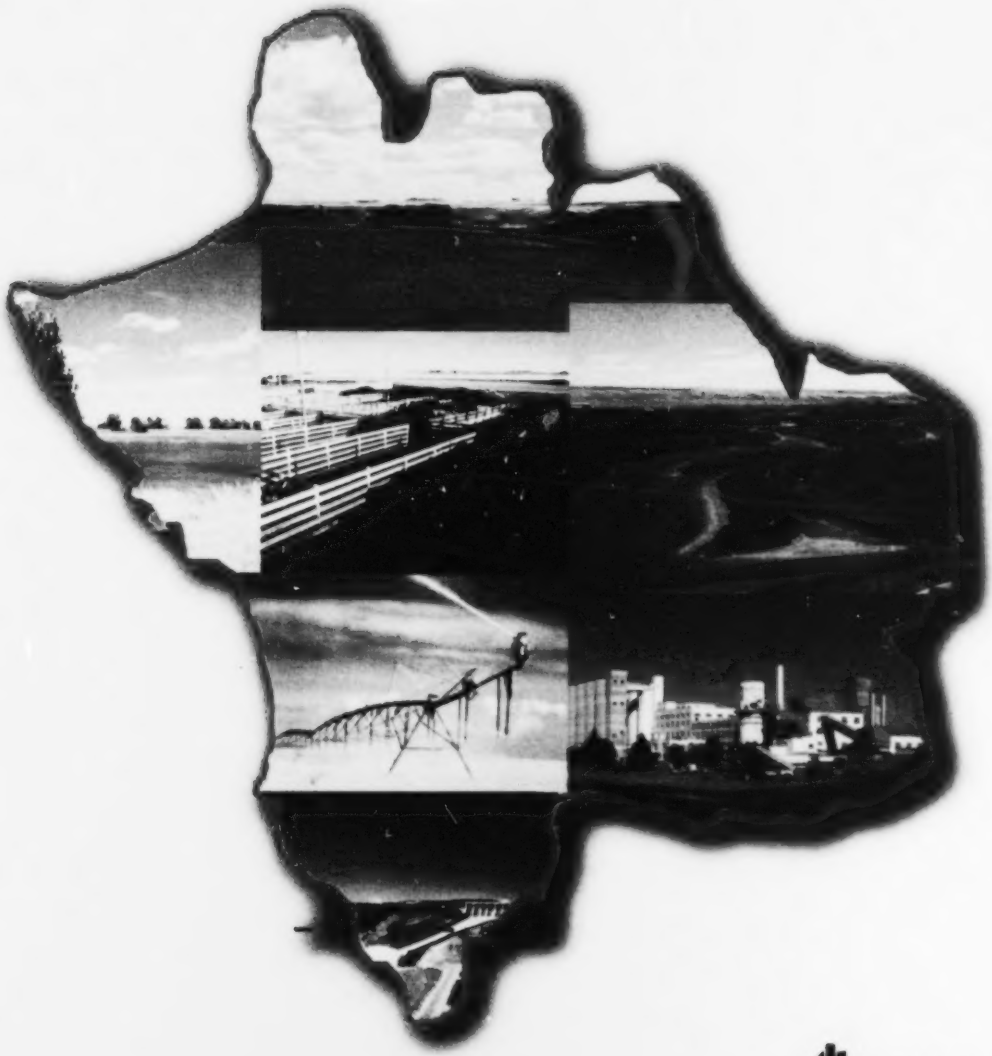

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Table of Contents

MAP OF THE SOUTH SASKATCHEWAN RIVER BASIN 1

INTRODUCTION 2
- Why is a Water Management Plan being prepared? 2
- What is the challenge? 2
- What were the objectives for the planning process? 3

PROCESS AND PUBLIC INVOLVEMENT 4
- Has the public been consulted? 4
- What is the proposed process for public consultation? 4

PHASE ONE 5
- What was the result of Phase One? 5

PHASE TWO 5
- What is the main objective of Phase Two? 5
- What are Water Conservation Objectives? 5

KEY FINDINGS 7
- What were the key findings of Phase Two? 7
- Water demand and comsumption 7
- Aquatic environment 8

BACKGROUND INFORMATION 8
- How much water is available? 8
- How much water do the rivers discharge? 9
- How much water is allocated? 10
- How is allocated water used? 11
- How much water do we pass to Saskatchewan? 12
- What is the anticipated future water demand for irrigation? 13
- What is the anticipated future water demand for other uses? 13
- What is the role of dams, canals and reservoirs? 14
- What is the role of high flow events? 15
- What impacts has water consumption had on the aquatic environment? 15
- What is the Water Resources Management Model? 17
- What were the results of the "initial" WRMM computer simulations for Phase Two? .. 18

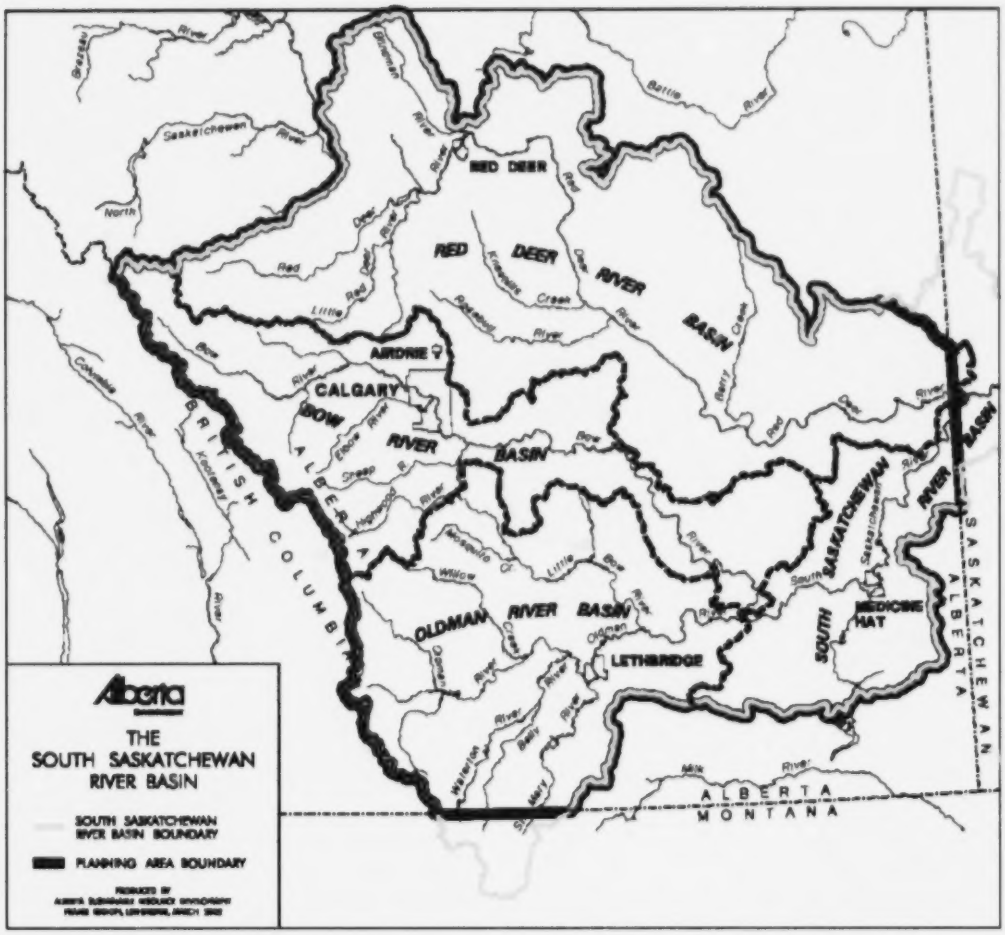
WHAT ARE THE KEY PROPOSALS OF THE DRAFT PLAN? 19
- What do these recommendations mean for southern Alberta? 20
- What are some of the positive aspects of a decision by Alberta Environment to no longer accept applications for new allocations? 20

ECONOMIC GROWTH OPPORTUNITIES WITH WATER AVAILABILITY CONSTRAINTS 21
- Demand-side Management 21
- Supply-side Management 22

WHERE CAN I GET MORE INFORMATION? 23

THE BASIN ADVISORY COMMITTEES 24

GLOSSARY 26



MAP OF SOUTH SASKATCHEWAN RIVER BASIN

The water withdrawn from the rivers of the South Saskatchewan River Basin (SSRB) plays a vital role in the economy of southern Alberta and the prosperity and quality of life we enjoy. The services and benefits of a healthy aquatic environment also contribute to our well being and lifestyle.

INTRODUCTION

This document provides background information for the draft Water Management Plan for the South Saskatchewan River Basin. It is intended to help the reader understand the reasons for the recommendations and provisions in the plan.

Why is a Water Management Plan being prepared?

In Alberta, our quality of life and life itself depend on having a safe and sustainable water supply for the environment, for our communities, and for economic well-being. Population growth, agricultural and industrial developments are increasing the demand and pressure on Alberta's water supplies, our economy, and our aquatic ecosystems. Nowhere is this more apparent than in Alberta's South Saskatchewan River Basin (SSRB).

In response to these demands, Alberta Environment led the development of a water management plan to better manage water in the SSRB. Phase One of the SSRB Water Management Plan approved the use of water allocation transfers and is currently being implemented. Phase Two is now complete. It dealt with identifying an acceptable balance between society's desire for water consumption and environmental protection. Phases One and Two have been melded to result in the present draft water management plan.

The plan focuses on a number of priority water issues in the SSRB that fall under the jurisdiction of Alberta Environment's Water Act. This plan was prepared using the best information available at the time, although it is not a comprehensive plan covering all aspects of the vast and complex subject of water in the basin.

What sub-basins are included in the SSRB?

The SSRB includes the sub-basins of the Red Deer River, Bow River, Oldman River and South Saskatchewan River (downstream of the confluence of the Bow and Oldman rivers up to the Saskatchewan border).

What is the challenge?

The SSRB faces a number of challenges:

- With the exception of the Red Deer River, rivers in the SSRB are highly allocated.
- Large increases in municipal, industrial, and stockwatering water demands are predicted, even after taking into consideration an expected decrease in per capita municipal use. It has been forecasted that demand for non-irrigation consumptive use could increase between 35 and 67 per cent by 2021, assuming the water is available. With its existing allocations, irrigation will continue to be the major consumer of water in the basin.

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- There is a significant gap between typical existing flows in the Bow, Oldman, South Saskatchewan, St. Mary, Belly, and Waterton Rivers below the major diversions and the flows required to maintain a functioning aquatic ecosystem in the long term.
- The aquatic environment has been adversely affected to varying degrees by water consumption.

Our society has already made many important decisions about water consumption. However, there are important decisions yet to be made about the use of water to support a growing economy, retaining water in the rivers for other users, and maintaining a sustainable aquatic ecosystem. It is not possible to have both a high degree of consumptive water use and a functioning aquatic ecosystem in the long term in any given river reach. Therefore, the challenge for the plan is to find an acceptable balance between water consumption and protection of the aquatic environment.

What were the objectives for the planning process?

The terms of reference for the planning process specified the following objectives.

- Educate the public on the status of water management in the SSRB.
- Review and update the existing 1990 Water Management Policy for the SSRB.
- Review and update the 1991 Water Allocation Regulation for the South Saskatchewan River Basin.
- Develop a strategy that best balances water consumption and environmental protection in the SSRB, including:
  - Recommend water conservation objectives (WCOs); and
  - Determine the volumes of water that may be available for future allocation, at various degrees of risk.
- Determine the matters and factors that the Director must consider in making decisions on applications for approvals, preliminary certificates, licences, or transfers of water allocations.
- Determine required amendments to Phase One of the Approved Water Management Plan, to be made when Phases One and Two are merged to become the new Approved Water Management Plan.
- Identify river reaches that could benefit from a riparian health assessment and make restoration of riparian conditions.
- Make recommendations for restoration of riparian vegetation.
- Suggest possible operational practices to allow high flow events for long-term health of the aquatic environment.
- Determine the next priorities for water management planning.
- Develop an implementation section for the plan to identify specific actions to be taken.

PROCESS AND PUBLIC INVOLVEMENT

Has the public been consulted?

Who is leading the process?
Alberta Environment is leading the planning process. The process is a combined effort shared by Alberta Environment, Alberta Agriculture, Food and Rural Development, and Alberta Sustainable Resource Development. Fisheries and Oceans Canada is also providing input.

During the last five years, the SSRB water management planning process involved consultation with four Basin Advisory Committees (BACs) located in the Red Deer River, Bow River, Oldman River, and the South Saskatchewan River sub-basins. Membership on the BACs was designed to represent all sectors interested in water management in the sub-basin. Typical sectors represented in a BAC include irrigation agriculture, non-irrigation agriculture, ecosystem protection, industry, municipal and recreation. During Phase One, the general public was consulted in a series of public meetings.

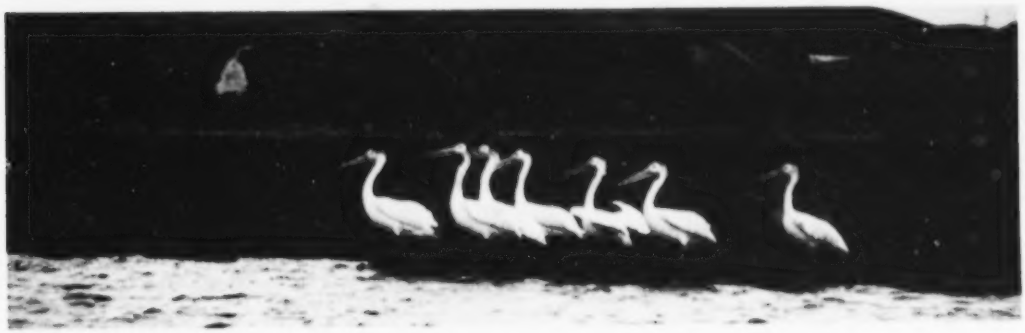
First Nations were not actively involved in the consultation efforts of Phase One due to a number of factors. Efforts have been made to consult First Nations more effectively during Phase Two of the planning process.

In July 2004, the BACs provided their recommendations in an integrated report for Phase Two, which was carefully considered in the preparation of the draft plan.

What is the proposed process for public consultation?

The following bullets outline the key steps anticipated during the coming months to obtain input from Albertan's and approval from Provincial Cabinet.

- Review of draft plan by:
  - General public;
  - Basin Advisory Committees; and
  - First Nations.
- Meetings to receive comments on draft plan with:
  - General public (seven locations)
  - First Nations.
- Final draft plan prepared with consideration of input.
- Submit final plan for approval by Provincial Cabinet and the Lieutenant Governor-In-Council.



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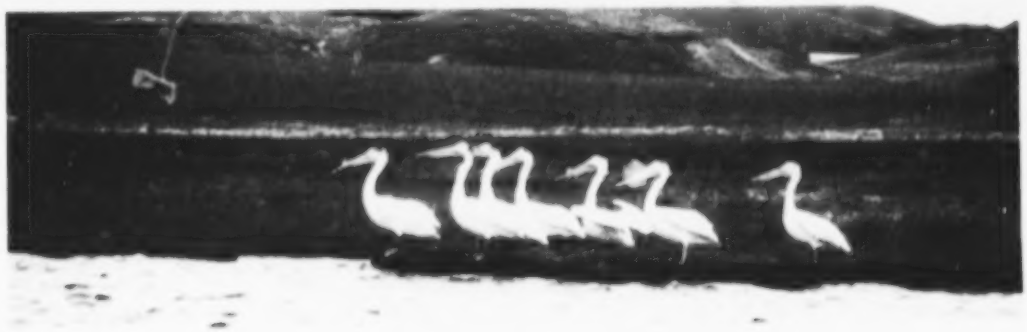


PHASE ONE

What was the result of Phase One?

Phase One of the water management plan was developed in consultation with the four BACs and the general public through a series of public meetings. It was approved in June 2002. Phase One determined that water resources in the SSRB are approaching their limits.

Where can I get a copy of the Phase One Plan?
The Plan is available online at
http://www3.gov.ab.ca/env/water/Regions/ssrb/draft_plan.html

Phase One authorizes water allocation transfers and water conservation holdbacks within the South Saskatchewan River Basin, subject to Alberta Environment's approval and conditions. It also resulted in Alberta Environment no longer accepting applications for new allocations from the highly allocated St. Mary, Belly, and Waterton Rivers.

What is a water allocation transfer?
A water allocation transfer occurs after the holder of an existing water withdrawal licence agrees to provide all or part of the amount they are allocated to another person or organization. Alberta Environment must approve any transfer of this kind and under the *Water Act*, may place conditions on the new licence.

What is a water conservation holdback?
If the Director decides that withholding water is in the public interest to protect the aquatic environment or to implement a water conservation objective, the Director may withhold up to 10 per cent of an allocation of water under a licence that is being transferred.

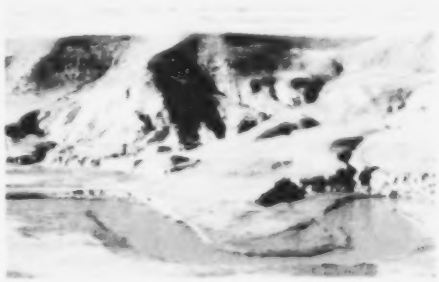
PHASE TWO

What is the main objective of Phase Two?

The main objective of Phase Two is to identify a publicly acceptable balance in the SSRB between society's need for water consumption and environmental protection. This involved consideration of southern Alberta's surface water needs for development and the needs of the aquatic environment. Recommended Water Conservation Objectives will be a key outcome. A pre-condition of the SSRB water management planning process was that no licence would be cancelled for the sole reason of accomplishing recommended plan outcomes.

What are Water Conservation Objectives?

Water Conservation Objectives (WCOs) are the amount and quality of water to remain in rivers for the protection of a natural water body and its aquatic environment. A complete definition of WCOs is located in the glossary.



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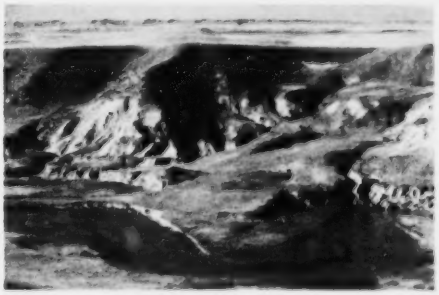

WCOs are flow targets for the amount and quality of water to remain in the river under

the First-In-Time, First-In-Right priority water allocation system. The WCO value will be placed on all new licences (in basins where licences are still being accepted). A licence containing a WCO requires there be no withdrawals when the river flows drop to minimum flow. This value may change from day to day.

The recommendations for WCOs contained in the draft plan pertain mostly to water quantity, as this is seen as the most pressing matter. Future water management planning could lead to amendments to the WCOs to incorporate water quality objectives.

A water management plan can only recommend WCOs, because only a designated Director under the Water Act has the authority to establish a WCO. The Director must conduct public consultation before establishing a WCO. The water management planning process will likely be considered sufficient public consultation by the Director.

In the draft plan, WCOs are recommended downstream of major dams and diversions of seven of the main rivers of the SSRB, specifically:

- Red Deer downstream of the Dickson Dam;
- Bow River downstream of the Bearspaw Dam;
- Oldman River downstream of the Oldman River Dam;
- All of the South Saskatchewan River;
- St. Mary River downstream of the St. Mary River Dam;
- Belly River downstream of the uppermost diversion; and
- Waterton River downstream of the Waterton River Dam.

Future water management planning could lead to further recommendation for WCOs for the upstream sections of these rivers and their tributaries.

WCOs can function in three ways:

1. As a condition on licences defining the minimum rate of flow at which water can be diverted.
   - Minimum flow or instream objectives have been attached as a condition on licences only since the early 1970s.
   - It must be recognized that older licences (which hold the vast majority of the allocated water in the SSRB) are not subject to these conditions. These licences will not be affected by WCOs that are established.
2. As a guideline for flows to be released from dams or passed over weirs.
3. As a guideline in water administration for when flows can be allocated or should be restored, and, in particular, justification for the use of water conservation holdbacks from transfers.

The actual implementation of WCOs in the third way above can be done through the issuance of a licence to hold the withheld water instream. This licence may be referred to as a "water conservation objective licence." However, this licence has a priority like any other licence, so the holder of a senior licence (that is, an older licence with a higher priority) has the right to divert this water for use.

Currently, the Water Act specifies that only the government can apply for and hold a "Water Conservation Objective" licence. However, as a result of public input, the water management plan recommends the Water Act be amended to permit private parties to hold such licences, when obtained through the transfer provisions of the Water Act.

WCOs can be for a variable rate of flow or for a single minimum flow. Variable rate of flow WCOs are calculated daily as a function of the theoretical natural flow to better reflect the variability of natural ecosystems. The recommended WCOs in the plan are a mix of variable flow targets and minimum flows.

KEY FINDINGS

What were the key findings of Phase Two?

To develop the water management plan, a number of reports identified the:

- extent of water allocation;
- status of the aquatic environment and river flows required for protecting the aquatic environment;
- estimates of future human demands for water; and
- sub-basin flow contributions to the Master Agreement on Apportionment (Alberta's requirement to deliver water to Saskatchewan).

Copies of these reports can be found at

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Master Agreement on Apportionment?
Alberta is required to pass half of the natural annual discharge from the SSRB to Saskatchewan.
Check out page 12 for a detailed explanation.

Key findings can be grouped into two main categories: water demand and consumption, and the aquatic environment's needs. A report on computer simulations of water management scenarios helped to explain and illustrate the connections between the findings.

Water demand and consumption

- SSRB rivers are highly allocated, with the exception of the Red Deer River.
- The Red Deer River is currently not subsidizing water use in the southern basins to a significant extent, but more water consumption (through existing licences) in the Bow and Oldman River basins could potentially require the Red Deer River to contribute more water, more frequently, to meet apportionment agreement (i.e. sharing of water with Saskatchewan).
- Newer licences in the Bow and Oldman Basins have significant risk of not receiving water in drier years.
- More efficient and complete use of existing licences (i.e. using more of their allocated water and reducing return flows) will increase risks to existing junior licences and further reduce instream flows.

- As southern Alberta continues to grow, there will be large increases in municipal, industrial, and stock-watering demands.
- Some expansion of irrigated acres in Irrigation Districts is possible within existing allocations. This expansion will increase water withdrawals (within existing licences) and decrease return flows through improved water management.
- While water development and licensing took place during the past century, First Nations in the SSRB were not in a position to obtain water licences with sufficient priority for a reliable water supply. With the exception of the Piikani Nation, water needs remain unresolved.

Aquatic environment

- Meeting instream flow needs in the Bow and Oldman Rivers downstream of the major water withdrawals requires more flow than is presently available, after water consumption. With existing allocations, restoring flows to these reaches would be very difficult.

What does instream flow need mean?
Instream flow needs are the quantities of water and water quality conditions needed to sustain riverine processes and associated ecosystems over the long term.

- The health of the aquatic environment is declining downstream of the major water withdrawals on the Bow and Oldman Rivers.
- Experts rate 22 of 33 main stem river reaches in the SSRB as 'Moderately Impacted,' five reaches as 'Heavily Impacted,' and three as 'Degraded.' The remaining three reaches overlapped categories in the grading system.
- Results from a recent Riparian Health Overview for the SSRB found 22 per cent of 94 sites rate as healthy (functioning), 49 per cent rate as healthy, but with problems (functioning, at risk), and 29 per cent are unhealthy (non-functioning).

BACKGROUND INFORMATION

Most of the flow of the SSRB originates from spring snowmelt in the Rocky Mountains. Rainfall can also be significant, particularly during May and June. In the late summer, glacial melt water contributes a small amount, generally about 2.5 per cent of the total annual flow in the Bow River upstream of Banff, but in low flow years, it can contribute up to 16 per cent. During the summer months, these contributions are about seven per cent during average flow years, but in the lowest flow year (1970), up to 47 per cent of the August flows upstream of Banff came from glacial meltwater.

How much water is available?

In the Bow and Oldman River sub-basins, new water allocations risk deficits in drier years. This is due to the existing degree of allocation, existing in-stream objectives, and meeting apportionment (50 per cent of the annual natural discharge, but never less than 2.1 million acre-feet available for use in Alberta).

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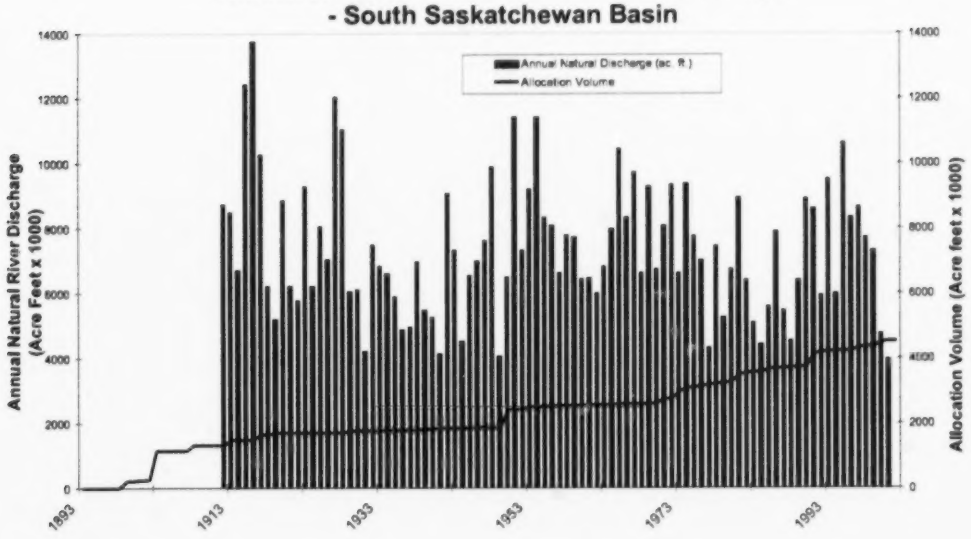
Allocation Volume & Annual Natural Discharge
- South Saskatchewan Basin



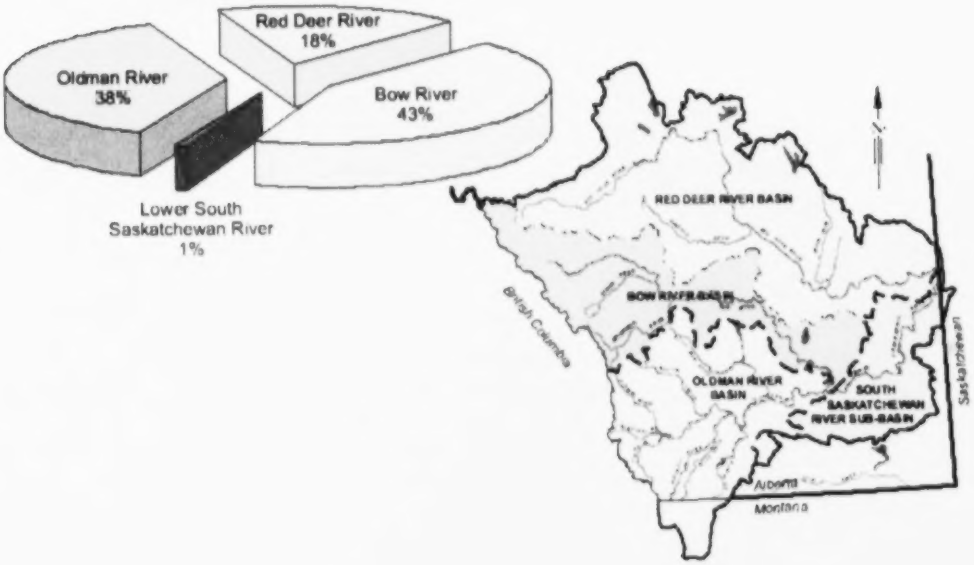
Computer simulations indicate that, with present allocations and commitments, there would be virtually no water available for new allocation 31 years out of a 68-year period on the lower South Saskatchewan River (assuming the recommended water conservation objective for the Red Deer River). Out of these 31 years, there could be periods of up to seven consecutive years with no water available to allocate.

Other water demand modeling shows that if future increasing water demands continue to be accommodated with allocations, the risk of not meeting apportionment or instream commitments will increase. This may require more frequent utilization of our provincial water storage such as Oldman and Dickson Dam to meet these commitments.

How much water do the rivers discharge?

The Bow and Oldman Rivers each have approximately the same discharge (approximately 3.6 and 3.2 million dam^3 respectively), while the Red Deer River discharge is about 50 per cent less (approximately 1.5 million dam^3).

SSRB Natural Flow: 1975 - 2001

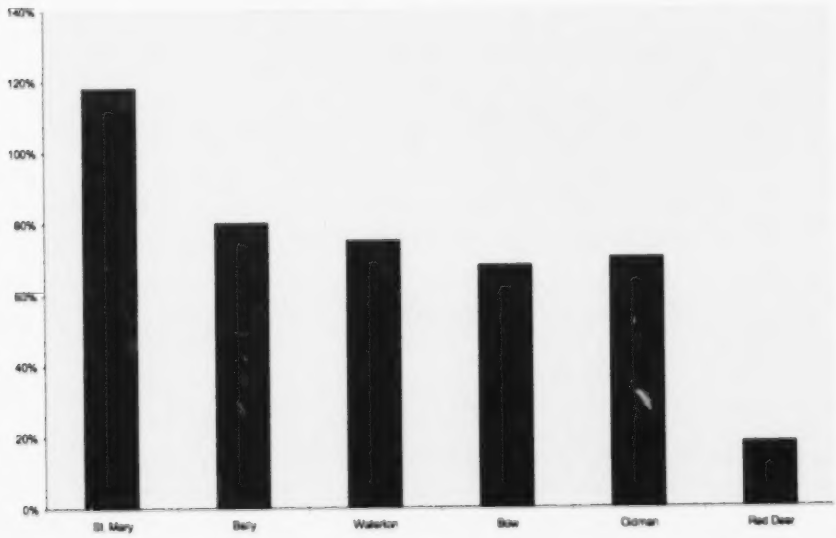


How much water is allocated?

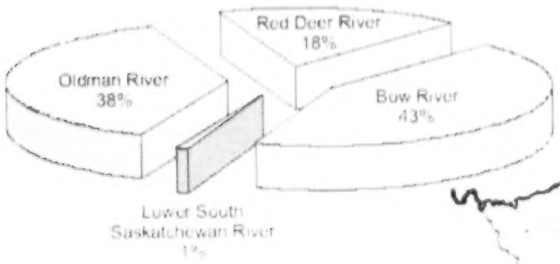
What is the "median" annual flow?
Median annual flow is comparable to the arithmetic average but differs in that median annual flow has an equal number of years with annual flows higher and lower.

A significant part of the flow of the Bow and Oldman Rivers is allocated: about 68 per cent and 70 per cent of the median annual flow, respectively. The southern tributaries of the Oldman River (Waterton, Belly and St. Mary Rivers) are highly allocated (75 to 118 per cent of the median annual flow). Applications for new allocations are not being accepted in the basins of the St. Mary, Waterton, and Belly Rivers. About 18 per cent of the median annual flow of the Red Deer River is presently allocated.

% of Median Annual Flow Allocated by River



SSRB Natural Flow: 1975 - 2001



How much water is allocated?

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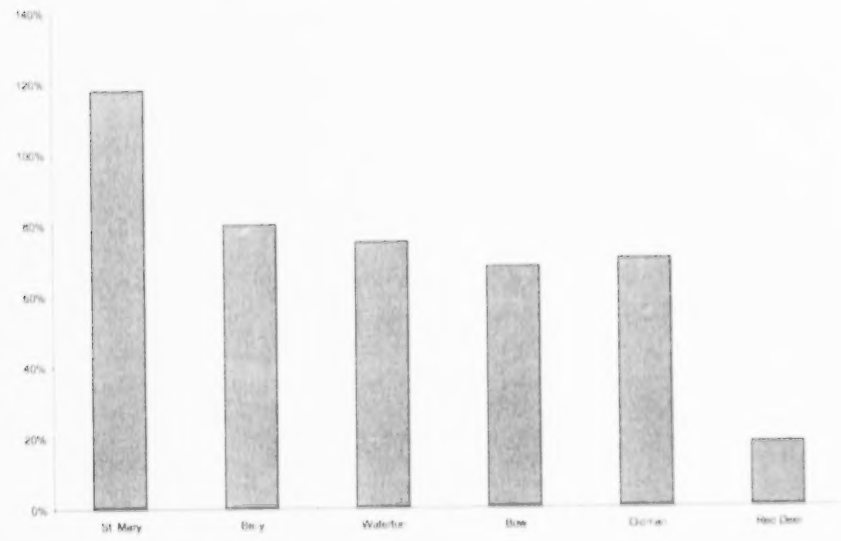
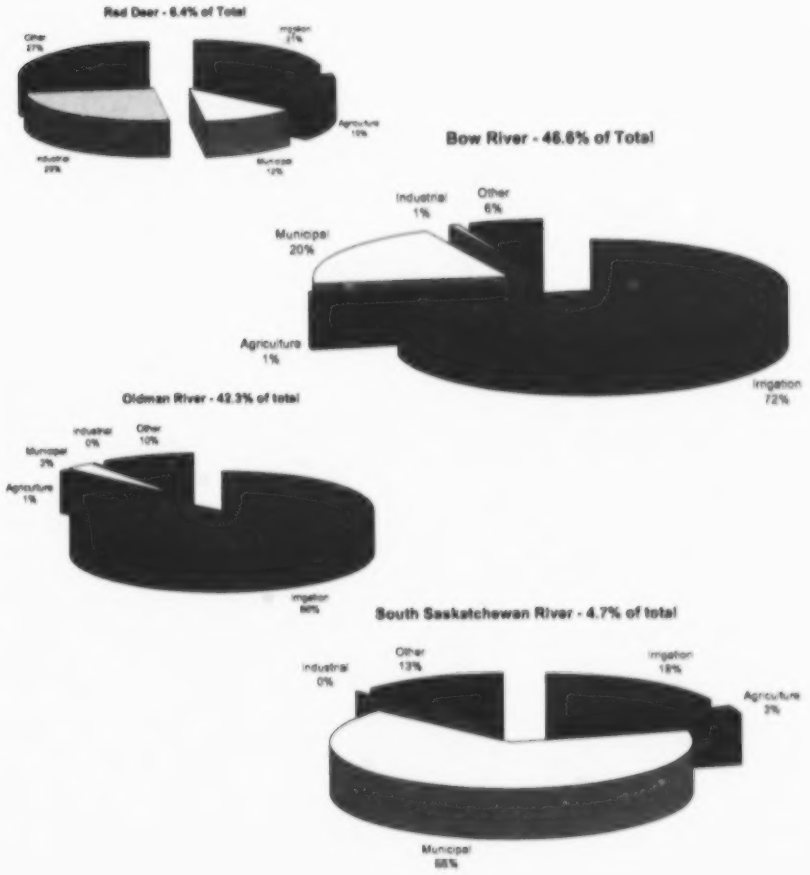


Beyond the numbers, additional factors to be considered when determining the impacts of various levels of allocation include flow patterns, storage capacity, the different purposes for which reservoirs are licenced, apportionment, and the frequency that water shortages occur. Water storage permits greater degrees of allocations since water from wet years can be stored for use in drier years.

Research is underway into possible changes to water supply and demand in the SSRB that may result from climate change.

How is allocated water used?

Most allocated water is used for irrigation (about 75 per cent of the licenced allocations in the SSRB). However, irrigation demand varies, depending on precipitation during the growing season. In wet years, less water is diverted, whereas a greater portion of the licenced allocation is diverted for irrigation in dry years. Under existing practices, irrigation districts typically return 20 to 30 per cent of their withdrawals. However, this return rate is expected to decrease in the future.



Currently, irrigation development occupies four per cent of the cultivated land in Alberta, yet contributes 18 per cent to the agri-food gross domestic product for Alberta.

Other major water users are municipalities, although they typically return more than 80 per cent of their withdrawals to the rivers.

Water consumption contributes significantly to the provincial economy. Benefits include crop and livestock production, food processing industries, petrochemical industries, municipal uses, and recreation on reservoirs.

As in many other jurisdictions around the world, water in Alberta is allocated from rivers under a priority system. Earlier licenses have a higher priority over licences granted at a later date. In order to leave water in the river for the aquatic environment, licences granted in recent years have conditions restricting withdrawals when river flows are less than a stipulated amount (i.e., the "instream objective").

How much water do we pass to Saskatchewan?

Alberta is a party to the Master Agreement on Apportionment between the prairie provinces and the federal government. This agreement requires Alberta to pass half of the natural annual discharge from the SSRB to Saskatchewan. Alberta must also never allow the rate of flow of the South Saskatchewan River (just below the confluence with the Red Deer River) to fall below 42.5 cubic meters per second (1,500 cubic feet per second), except when the natural rate of flow is less.

Alberta has continuously upheld its commitment to meet apportionment and typically has passed about 75 per cent of the annual discharge of the SSRB to Saskatchewan. The Red Deer River has not been required to contribute more than half its natural flow to apportionment, except in 1988 when the contribution was slightly more than 50 per cent, and several days in October 2001, when water was released from Gleniffer Lake to maintain instantaneous discharge. Flows remaining in the river for the aquatic environment have the added benefit of serving as apportionment flows and vice versa.

In 2001, the natural discharge (i.e. the discharge that would have occurred in the absence of any withdrawals) of the SSRB was less than the total amount of water allocated. This was the lowest discharge ever recorded. In that year, about 54 per cent of the natural discharge was passed to Saskatchewan, and water stored in the basin was depleted. Water shortages occurred in the Oldman River sub-basin. However, the impacts were mitigated to a large extent by senior licence holders (irrigation districts) sharing water with more junior licence holders such as towns, villages, industries, and private irrigators.

At the present time, flows from the Bow and Oldman Rivers can generally meet the instantaneous discharge requirements of apportionment (assuming that some water is available in the Oldman River Dam Reservoir to supplement flows). However, as the use of existing licences in these basins increases, more of Red Deer River flows may be required for apportionment.

What is the anticipated future water demand for irrigation?

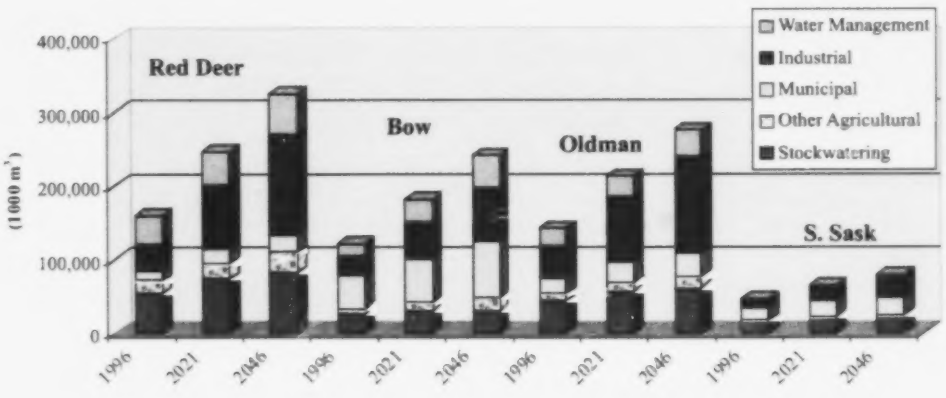
In 1991, in view of limitations on available water, a regulation was approved that placed a "cap" on irrigation development (irrigation districts, private irrigation outside the districts, and a number of "named projects"). Between current irrigation development and applications in process, the "cap" has almost been reached in the Bow and Oldman River basins. Under the Irrigation Districts Act, irrigation districts may expand their irrigated areas with the water available from their licenced allocations. Studies have shown that with present licences (and with increased efficiency), the areas in irrigation districts have the potential to expand by up to about 10 and 20 per cent in the Oldman and Bow River basins, respectively. It is anticipated that irrigation expansion and increased efficiencies will result in more frequent higher use of licenced allocations and decreased return flows. There is potential supply for additional irrigation in the Red Deer River basin.

What is the anticipated future water demand for other uses?

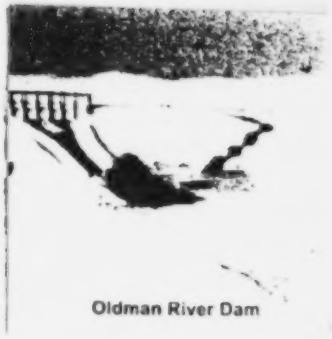
The demand from other uses of water in the SSRB is expected to increase dramatically. This increasing demand for water, in light of a limited supply, represents a great challenge to southern Alberta. For example:

- The population of the SSRB is expected to grow from approximately 1.3 million (1996) to more than two million by 2021. By 2046, the population of the SSRB is expected to grow to more than 3 million; and
- By the year 2046, demand for non-irrigation water withdrawals is forecasted to increase between 52 and 136 per cent.

Anticipated Future Demand for Non-irrigation Water Use



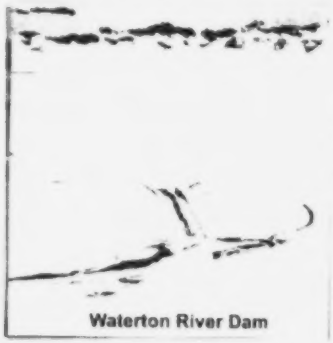
What is the role of dams, canals and reservoirs?



Oldman River Dam

Dams and reservoirs play a major role in water management in the SSRB. They allow water to be captured when it is plentiful (usually in the spring), and stored for use when the need for it is greater (usually in later summer, but also in winter for hydropower). The public and private water storage in the SSRB is approximately 2.9 million acre-feet.

The Dickson Dam on the Red Deer River, owned by Alberta Environment, is operated as a multi-purpose facility. It releases stored water from Glennifer Lake to provide a reliable source of water for downstream licenced water users, to help meet apportionment (if required), and to maintain water quality in the winter months (e.g., for waste assimilation through Red Deer).



Waterton River Dam

The Oldman River Dam and reservoir, owned by Alberta Environment, is also a multi-purpose facility. It releases stored water to help licenced water users avoid shortages, to help meet apportionment, and to maintain flows for the aquatic environment. During certain times of the year, there may be opportunities for flow management to provide benefits for the aquatic and riparian environment. These opportunities are dependent on many things, including the time of year, reservoir storage levels, the magnitude of releases, and biological benefits.

TransAlta Utilities owns and operates several dams and reservoirs in the upper portion of the Bow River basin. These reservoirs are filled during the summer and water is released during the winter for power generation. Enhanced winter flows prevent ice damming and help dilute wastewater from Calgary.

The Bassano Dam on the Bow River is owned and operated by the Eastern Irrigation District to divert water into the district. Other major diversions are the Western Irrigation District weir located in Calgary, the Carseland weir, which diverts water for the Bow River Irrigation District, and the Lethbridge Northern Irrigation District weir located on the Oldman River near Brocket. The series of dams, weirs, and canals comprising the St. Mary River Project collect and convey water from the Waterton, Belly and St. Mary Rivers for the irrigation districts south of the Oldman River, the largest of which is the St. Mary River Irrigation District. Several of the irrigation districts have significant off-stream storage.

Construction of additional reservoirs to capture high flows may have some potential to improve water supplies. Considerable study is required to assess the cost effectiveness, environmental impacts, and overall water management

benefits of new reservoirs.

What is the role of high flow events?

Periodic high flow events play an important role in the aquatic environments of the SSRB. They help maintain water quality by flushing out accumulations of aquatic vegetation, sediments, and debris. They create fish habitat by sorting and cleaning spawning gravels and create conditions ideal for regeneration of cottonwood forests.

The presence of dams and reservoirs reduces the frequency, magnitude, and duration of these high flow events as water is held in storage. Alberta Environment's Water Management Operations Division manages the Oldman River Dam (and to a lesser extent the Dickson Dam) to take advantage of high flow conditions when they occur to benefit the aquatic environment.

What impacts has water consumption had on the aquatic environment?

The aquatic environment includes both the life in the river water and the river valley or riparian vegetation. Riparian vegetation provides important wildlife habitat, although it occupies a relatively small land area in the grasslands. Healthy riparian areas provide a number of benefits: they help limit erosion, recharge groundwater, improve water quality, and contribute to biodiversity.

The diversion of water from the rivers has had negative effects on the aquatic environment to varying degrees. A study has determined the river flows necessary to maintain a functioning aquatic environment in the long-term. These flows are referred to as "in-stream flow needs" (IFN). They include flows required to maintain riparian vegetation, fish habitat, channel maintenance processes, and water quality. This study concluded the following:

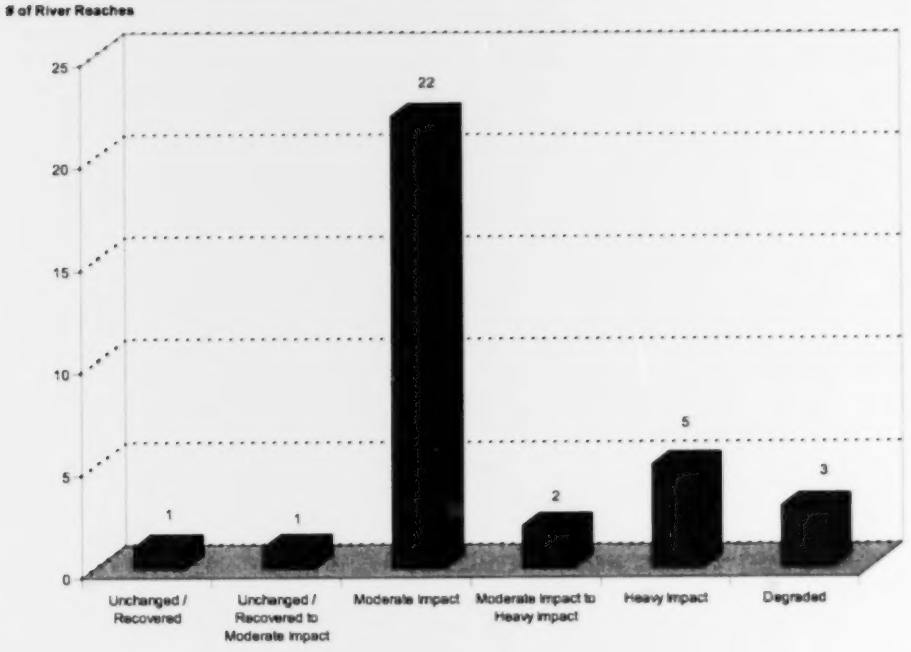
- Variable flows are important to maintain habitat for fish and to permit cottonwoods to reseed and replenish.
- Sufficient flow is required to support water quality needs (temperature and dissolved oxygen) for fish and to assimilate wastewater from cities and industries to acceptable standards.

With existing water allocations, there are insufficient flows in the Bow and

Oldman Rivers to meet the IFN. Even if water consumption was reduced by 20 per cent, river flows would still be substantially below IFN. There may, however, be opportunities to mitigate impacts on the aquatic environment in the SSRB, whether they are the result of water quantity, water quality, or land use issues.

There are currently "instream objectives" used in water management that determine the amount of water to remain in the river for the aquatic environment. None assure complete protection of the aquatic environment, and some provide minimal protection. In most rivers of the SSRB, the water supply provides flows above the in-stream objectives for at least part of the year. However, in dry years, river flows may be reduced to or below the in-stream objectives. As more water is allocated or existing allocations are used more completely, the rivers will run closer to the instream objectives. The proposed SSRB plan will replace the instream objectives with water conservation objectives that will permit more water to be dedicated to instream flow when opportunities to do so arise.

Existing Condition: Overview



An expert opinion overview on the riparian and aquatic condition of the SSRB indicated that the aquatic environment has been affected to varying degrees by altered flow regimes, land use, and pollution. As noted in the graph above most river reaches in the SSRB were considered to be "moderately impacted", but some were rated as "heavily impacted" or "degraded." Recent monitoring on the Bow River reinforced the concerns raised by these experts regarding dissolved oxygen in the stream.

Alberta Environment is building on this study by conducting an Aquatic and Riparian Condition Assessment for the main rivers of the SSRB. This assessment is a scientific evaluation of the condition of aquatic and riparian ecosystems. It examines three subjects: riparian health, hydrological alteration (i.e. the degree to which water flows have been altered), and water quality (using the best available water quality measures). Scheduled to be complete in March 2006, this analysis will inform and guide efforts by Watershed Planning and Advisory Councils to understand and identify the reaches where improvements can be made.

The riparian health component of the study is complete, revealing the Red Deer River has the greatest proportion of healthy sites, while the St. Mary and South Saskatchewan Rivers have no healthy sites. Overall, 22 per cent of the sites rate as healthy (functioning), 49 per cent rate as healthy, but with problems (functioning, at risk), and 29 per cent are unhealthy (non-functioning). The Red Deer River has the fewest reductions in riparian health due to hydrologic parameters. Maintaining a healthy aquatic environment is an important consideration for the Red Deer River, along which is located Dinosaur Provincial Park, a World Heritage Site. The plains cottonwood riparian forests are part of the values protected by the park and World Heritage Site.

If Alberta typically passes 75 per cent of the natural flow (total annual volume) of the SSRB to Saskatchewan each year, why is the aquatic environment under stress in the Bow and Oldman River basins? The pattern of flows (frequency, magnitude, and duration) is likely more important to ecosystem health than total annual volumes. The pattern of flows in the Bow and Oldman Rivers has been altered in two significant ways.

1. Due to water withdrawals, there are periods in the summer where flows are lower than natural levels, placing stress on the aquatic environment. As existing licences are more fully utilized, the situation will further deteriorate.
2. Due to hydropower generation on the Bow River, considerable water is passed to Saskatchewan during the winter, when flows have limited benefit for the aquatic environment, but provide the benefit of diluting wastewater from Calgary.

Alberta Environment is responsible for managing river flows, while the management of land use is responsibility of landowners, lease holders, municipalities, and other government agencies. Alberta Environment will continue to work with these parties as part of Watershed Planning and Advisory Councils to prepare watershed management plans to achieve healthy riparian ecosystems.

What is the Water Resources Management Model?

The Water Resources Management Model (WRMM) is a computer simulation model developed by Alberta Environment that compares water supplies and demands in a river basin over a long-term time series. In the SSRB, water supplies during the historical period 1928-1995 are compared on a weekly basis

with demands. The model incorporates all existing major infrastructure in the SSRB. The main basis of the modeling is to allocate the available water supply to the various demands in order of licence priority and to make best use of storage structures to mitigate shortages in times of low water supply and high demand.

Principal inputs to the model are:

- Historical climatic and river natural flow data (1928 - 1995);
- Irrigation district and private irrigation consumptive use and return;
- Non-irrigation withdrawals (municipal, industrial, and other projects);
- Instream objectives (fish habitat and water quality);
- Reservoir and canal structure capacities and discharge limitations;
- Licence priorities, conditions and volume/rate limits;
- Operating policies for structures; and
- Master Agreement on Apportionment with Saskatchewan.

For each scenario, results are calculated for all demands, structure storages, and flows. The performance of the demand requirements is determined in terms of deficits; that is, the frequency of deficits (inability to meet the demand requirement due to insufficient water).

What were the results of the "initial" WRMM computer simulations for Phase Two?

With the help of computer simulations, a number of key conclusions have been reached on the status of water management in the SSRB. These are summarized below and in all cases, should be considered as "potential impacts".

In the following, for purposes of the simulations, deficits are defined as follows.

- For irrigation water demand is not met by a depth of 100 mm or greater in a year. (Crop water requirements can typically range from 400 mm to 700 mm for a year.)
- For other allocations the allocation receives less than 90 per cent of the allocation.

With the existing allocations

- In the Red Deer River and Oldman River / South Saskatchewan River mainstems, there are few user deficits. Existing in-stream objectives are always met.
- In the Bow River sub-basin, junior allocations have frequent, substantial deficits. Above Bassano, existing in-stream objectives are frequently not met. They are always met below Bassano, but in-stream flows are frequently at the in-stream objective value of 11.33 m^3/s (400 ft^3/sec).
- In the Oldman River's Southern Tributaries, junior allocations have frequent, substantial deficits. Most of the time, these rivers flow at the minimum flows stipulated by the South Saskatchewan Basin Water Allocation Regulation.

With future increases in allocations

- In the Red Deer River sub-basin, junior allocations have infrequent, small deficits.
- In the Bow River sub-basin, with increasing utilization of existing allocations, junior allocations and commitments will have more frequent substantial deficits.
- In the Oldman River/South Saskatchewan River mainstem (where most of the non-district expansion occurs), deficits to junior allocations increase since the consumptive demand relying on Oldman Reservoir storage is increased.
- In the Oldman River's Southern Tributaries (where expansion is limited to non-district irrigation applications received), junior allocations have frequent, substantial deficits.

With full possible water use by irrigation districts and 50-year projected non-irrigation increases in water demands

- There will be substantial negative impacts on junior licences.
- The 50-year projected non-irrigation water use will have very frequent, large deficits.

Other conclusions:

- Applying IFN as a condition on existing and future junior licences would render them substantially unusable; therefore retrofit provisions are not recommended.
- In the Red Deer River sub-basin, there is potential to increase the instream objectives above existing levels and provide for additional allocation. However, the ability to increase in-stream objectives or to issue additional allocations in the Bow River and Oldman River sub-basins is limited.

WHAT ARE THE KEY PROPOSALS OF THE DRAFT PLAN?

The draft plan recognizes there is very little water left to allocate in the sub-basins of the Bow, Oldman and South Saskatchewan Rivers. The draft plan recommends Alberta Environment stop accepting applications for new allocations until the Minister of Environment creates an order (a Crown Reservation) that specifies the purposes for which any water that is unallocated shall be used. The draft plan recommends a maximum allocation volume for the Red Deer River.

The draft plan recommends WCOs for seven major rivers in the SSRB downstream of major dams and diversions. The recommended WCO and allocation limit for the Red Deer River is intended to make water available for economic development, while setting a limit on adverse effects on the aquatic environment. The WCOs for the other rivers are intended to permit Alberta Environment to take advantage of opportunities for gradual flow restoration (primarily water conservation holdbacks from transfers).

What do these recommendations mean for southern Alberta?

- We are entering a new age of water awareness and water and watershed management. Planning for the management and protection of water will involve repeated cycles of planning to continuously improve water management.
- In general, the value of water will become better recognized and understood by the residents of the SSRB.
- The water requirements for economic growth in the Bow, Oldman, and South Saskatchewan River sub-basins will be found through transfers, more precise and intensive water administration by Alberta Environment, voluntary actions by licence holders in the market place, and by more efficient use of water. (This is discussed in more detail in the next pages.)
- The WCOs recommended for the Bow, Oldman, South Saskatchewan, St. Mary, Belly, and Waterton Rivers, will only be a first step in restoring aquatic environments to a healthy condition. Although the proposed WCOs may not always be met, they do provide a way to take advantage of opportunities to restore some flow, such as water conservation holdbacks. The rate of restoration will be very slow, so no economic impacts are expected. Scientific research is required to determine precise flow restoration targets. These targets could represent a degree of impact on the aquatic environment that the public finds more acceptable, in view of the economic and social benefits of water consumption.
- Improvements in water quality in rivers could lead to the water presently being used for waste assimilation in rivers becoming available for other purposes. Improvements in water quality can be achieved by upgrading wastewater treatment facilities and improving land use management.
- The limit on allocation for the Red Deer is intended to limit the degree of degradation of the aquatic environment as compared to what is presently observed in the lower reaches of the rivers in the Bow, Oldman, and South Saskatchewan sub-basins.
- There will be water available for future consumptive use in the Red Deer River, although it must be recognized the Red Deer River has half the flows of the Bow or Oldman Rivers.
- The winter minimum flow of 16 cms for the Red Deer River has the implication that new licenses for year round diversion will require storage. Winter flows are usually less than 16 cms so water will likely not be available for diversion then.

What are some of the positive aspects of a decision by Alberta Environment to no longer accept applications for new allocations?

- Water allocation transfers will be given serious consideration as a way to obtain a reliable water supply. Demand for transfers is expected to increase water use efficiency and effectiveness by providing an incentive to existing licence holders to use less water and for water to become available to the most economically beneficial uses.

- Water conservation and innovation will be encouraged as licence holders use their allocations as efficiently as possible.
- As was demonstrated in the Oldman River sub-basin in the very dry summer of 2001, sharing between senior and junior licence holders can help a community weather a drought. If the number of new licences does not continue to expand indefinitely the senior licence holders are more likely to remain favorably inclined to share in times of shortage.
- Southern Albertans will be able to live within the capacity of the SSRB watershed. One of the principles of the Water for Life strategy is Alberta's water resources must be managed within the capacity of individual watersheds.
- Future demands on water from the Red Deer River to meet the Master Agreement on Apportionment will not increase as much as they otherwise would.
- The demands on Alberta Environment for compliance and enforcement actions will not increase indefinitely.
- Options for meeting the water needs of First Nations will remain.
- Society will not become even more vulnerable to the risks of possible climate change impacts such as reduced water supply or changes to the timing of flows.

ECONOMIC GROWTH OPPORTUNITIES WITH WATER AVAILABILITY CONSTRAINTS

Water availability constraints need not limit economic growth opportunities, as there are options available for making water available for new uses or expansion of existing ones even when new allocations are no longer available. These options have the potential for making water available that would be more reliable than a new, high risk licence. These options are in two broad categories:

1. Demand-side management
2. Supply-side management

Demand-side Management

1. Improvements and innovations in water administration by Alberta Environment

There are several avenues Alberta Environment can explore to improve its administration of the water resource to ensure water use and allocations are properly and accurately accounted for. These would provide high confidence knowledge on the amount of water actually available for allocation. The overriding goal is to ensure all water licences are appropriately and realistically sized for the needs of water users. Steps that can be taken achieve this include:

- Intensive monitoring of actual use.
- Improvements in real-time or near real-time water use and stream flow monitoring and making data available.

- Investigating unauthorized water use and follow up with education and enforcement to achieve compliance.
- Exploring options for un-used allocations (e.g. relative to growth and development predictions).
- Ensuring all licences are in use with up-to-date and accurate records.
- Exploring innovations in water licencing to precisely match allocations with actual consumption.
- The Crown Reservation instrument provided by the Water Act is a tool that can lead to water being allocated to specific purposes to achieve societal goals.

2. Development of Water Markets

With the introduction of water allocation transfers in the SSRB, a small number of transfers has taken place and a market in water allocations is starting to develop.

In the long run, water allocation transfers will help water allocations move to the most economically beneficial uses. Concurrently, they will provide an incentive to licence holders to increase efficiency in order to generate surplus water for the market. Restricted access to new licences will allow a market system to develop.

Development of the market will be facilitated by a number of events. One is the creation of of water agents, brokers or a trading center. This in itself can be viewed as a new form of economic activity, much as the real estate industry has developed over time. These new services would promote an efficient market place by helping buyers and sellers find each other. They could also be a source of information on prices relative to licence priority, volume, location, and other factors.

3. Improvements and innovations in the efficiency of water use

Restrictions on new water allocations will provide an incentive to licence holders to explore innovations to increase water productivity. This can be expected to lead to: utilization and development of new technologies, incentives for efficiency and disincentives for waste, upgrades to existing infrastructure, and improved risk management planning.

Supply-side Management

The most obvious possibility for action to make more water available is increased water storage in reservoirs. This would enable water to be stored when it is plentiful (primarily during snowmelt in June) for use later when it is not. Storage can be developed and owned privately or by the government for public purposes. Any storage reservoirs developed are most likely to be located "off-stream."

The Water For Life strategy calls for Watershed Planning and Advisory Councils to consider the need for new storage in the development of watershed management plans.

Another option for supply-side management is to increase the use of groundwater. However, the extent of this resource and its connection to surface water is not well understood. Research is planned by Alberta Environment under the Water For Life strategy.

WHERE CAN I GET MORE INFORMATION?

Copies of the full reports can be referenced online at http://www.environment.gov.ab.ca

For additional information, contact Alberta Environment at (403) 297-6250 (toll-free in Alberta by calling 310-000).

THE BASIN ADVISORY COMMITTEES

South Saskatchewan River BAC

SOUTH SASKATCHEWAN RIVER SUB-BASIN BAC		
Frank Wetsch, Chair	Urban Municipal	City of Medicine Hat
Grayson Mauch, Vice-chair	Urban Municipal	City of Medicine Hat
Floyd Haas	Rural Municipal and Agriculture (other water users)	Cypress County
Ron Wendling	Industry	Canadian Fertilizers Ltd.
Jim French	Industry	Canadian Fertilizers Ltd.
Corlaine Gardner	Environmental	Grassland Naturalists
Duncan Baldie	Recreation	Redcliff Anglers
Gary Bierback	Irrigation	St. Mary River Irrigation District

Bow River BAC

Name	Sector	Specific Affiliation
BOW RIVER BAC		
Steve Meadows, Chair	General Public	
Lori Brewer-Lawe	General Public	
Gloria Wilkinson	General Public	
Bert van Duin	Industry	Westhoff Engineering Resources Inc.
Gord MacMahon	Industry	APF Energy / Trees Alive Alberta
Chantelle Cardinal	First Nations	First Nations Technical Services Advisory Group
Annette Lonechild	First Nations	Stoney First Nation
Cedric Solway	First Nations	Siksika First Nation
Norm Carlson	Health Authorities	Calgary Health Region
Roger Drury	Water Power	TransAlta Utilities Corporation
Paul Fesko	Urban Municipal	City of Calgary
Melanie Cook	Urban Municipal	City of Calgary
Yin Deong	Urban Municipal	City of Calgary
Judy Stewart	Urban Municipal	Town of Cochrane
Neil Hollands	Urban Municipal	Town of Brooks
Hugh Pepper	Rural Municipal	M.D. of Bighorn No. 8
Vince Fabian	Rural Municipal	County of Newell No. 4
Dr. Derald Smith	Academia	University of Calgary
Gary Kindrat	Ecosystem Protection	Ducks Unlimited
Chris Manderson	Ecosystem Protection	City of Calgary
Heinz Unger, Vice-chair	Ecosystem Protection	Alberta Wilderness Association
Bonnie Kleinmark	Ecosystem Protection	River Valley Committee, Parks Calgary Foundation
Mona Keffer	Fisheries	Alberta Wilderness Association
Richard Phillips, Vice-chair	Irrigation	Bow River Irrigation District
Jim Webber	Irrigation	Western Irrigation District
Earl Wilson	Irrigation	Eastern Irrigation District
Chris Vermeeren	Ranching/Stock Watering	County of Newell No. 4
Robert Everett	Recreation	Sarcee Fish & Game Association
Sheena Majewski	Observer	Dept. of Fisheries and Oceans Canada
Mark Bennett	BRBC Liaison	Bow River Basin Council
Mike Murray	BRBC Liaison	Bow River Basin Council

Red Deer River BAC

RED DEER RIVER BAC		
Al Kennedy, Chair	Industry	Nova Chemicals
Gordon Musgrove	Rural Municipal	County of Newell No. 4
Dug Major	Rural Municipal	Special Areas
Art Grenville	Rural Municipal	Starland County
Ian Harvie	Rural Municipal	Mountain View County
Allison Williams	Rural Municipal	Mountain View County
Ken Van Dewark	Rural Municipal	Red Deer County
John Van Doesburg	Rural Municipal	Mountain View County
Douglas Fleming	Municipal	Palliser Regional Municipal Services
Bill Shaw	Urban Municipal	Represented 23 towns, villages and the City of Red Deer
Myrna Bauman	Urban Municipal	Town of Three Hills
Greg Conn	Agriculture	Alberta Beef Producers
Jack Swainson	Agriculture	Alberta Conservation Tillage Society
Colin Kure	Upstream Recreation	Alberta Fish and Game Association
Jill Dyck	Downstream Recreation	Alberta Fish and Game Association
Margaret Coutts, Vice-chair	Ecosystem Protection	Red Deer River Naturalists
Tracy Scott	Ecosystem Protection	Ducks Unlimited
Todd McBride	Tourism	

Oldman River BAC

OLDMAN RIVER BAC		
Duncan Lloyd, Chair	Urban Municipal	Town of Coaldale
Barbara Lacey, Vice-chair	Urban Municipal	City of Lethbridge
Doug Kaupp	Urban Municipal	City of Lethbridge
Garth Bekkering	Urban Municipal	Town of Taber
Ralph Bourque, Vice-chair	Urban Municipal	Town of Pincher Creek
Brian Hammond	Rural Municipal	M.D. of Pincher Creek
Hank Van Beers	Rural Municipal	M.D. of Taber
Cecil West	Rural Municipal	M.D. of Taber
Greg Nikles	Industry	Rogers Sugar Ltd.
Ron Renwick	Irrigation	St. Mary River Irrigation District
Kevin Haggart	Irrigation	Lethbridge Northern Irrigation District
Larry Nolan	Agriculture (other water users)	
Jim Clarke	Recreation	Lethbridge Fish & Game Association (affiliated with Alberta Fish & Game Association)
Cheryl Bradley	Ecosystem Protection	Southern Alberta Environmental Group
Cheryl Fujikawa	Ecosystem Protection	Southern Alberta Environmental Group
Gary Kindrat	Ecosystem Protection	Ducks Unlimited
Henry Bosman		Oldman Dam Environmental Advisory Committee
Andrew Hurly		Oldman Dam Environmental Advisory Committee

Glossary

AENV ~ Alberta Environment

Allocation ~ The volume, rate and timing of a diversion of water. When water is redirected for a use other than for domestic purposes (use by an owner of property adjacent to a water body or from an aquifer), it is referred to as an allocation. All water users (except for household users) apply to Alberta Environment for a licence to use a set allocation of water.

Apportionment ~ (see Master Agreement on Apportionment)

Approval ~ Under the Water Act, an approval provides authority for constructing works or for undertaking an activity within a water body. The approval includes conditions under which the activity can take place.

Aquatic Environment ~ (As defined in Alberta's Water Act) The components of the earth related to, living in or located in or on water or the beds or shores of a water body, including but not limited to all organic and inorganic matter, and living organisms and their habitat, including fish habitat, and their interacting natural systems.

BAC / Basin Advisory Committee ~ Established in each of the four sub-basins of the South Saskatchewan River Basin to provide advice for the SSRB Water Management Plan. Members of the BACs represented all sectors interested in water management in the sub-basin. Each sector selected its own representatives on the BAC. Typical sectors represented in a BAC include irrigation agriculture, non-irrigation agriculture, ecosystem protection/environmental, First Nations, industry, municipal and recreation.

Crown Reservation ~ Section 35(1) of the Water Act states that "the Minister may by order reserve water that is not currently allocated under a licence or registration or specified in a preliminary certificate

(a) in order to determine how the water should be used, or

(b) for any other purpose."

dam^3 ~ decametres cubed (1,000 cubic meters). 1 dam^3 = 0.81 acre feet.

Director ~ For purposes of administration of the Water Act, certain staff in Alberta Environment, such as Approvals Managers, are designated as "Director". Under the Water Act the Director has sole authority to make decisions concerning a number of specified subjects, e.g., transfers, holdbacks, establishing WCOs.

Dissolved Oxygen ~ Amount of available oxygen contained in the water, but not including the oxygen that is part of the water molecule (H2O). Expressed as milligrams per litre.

Instream Flow ~ The rate of flow in a river, without reference to its purpose.

Instream Flow Needs (IFN) ~ This is the scientifically determined amount of water, flow rate, water level or water quality that is required in a river or other body of water to sustain a healthy aquatic environment or to meet human needs such as recreation, navigation, waste assimilation, or aesthetics.

Instream Objectives ~ Flows that are to remain in the river via dam operations or as a restriction on licences. Instream Objectives are in place in all SSRB rivers below dams, although some offer limited protection of the aquatic environment. Instream Objectives have usually been set in response to fish habitat instream needs (the Fish Rule Curve) and/or water quality.

Irrigation District ~ An organization that owns and manages a water delivery system for irrigation for a given region. In Alberta, there are 13 irrigation districts. Some districts convey water for other purposes such as municipal use and stockwatering.

Master Agreement on Apportionment ~ Schedule A of the 1969 Master Agreement on Apportionment for the South Saskatchewan River between Alberta and Saskatchewan allows Alberta to "divert, store or consume" from the river system each year, a volume of water equal to one-half of the apportionable flow of the South Saskatchewan River at the Alberta-Saskatchewan boundary. The remaining volume of flow must be allowed to pass downstream into Saskatchewan. The exception to this general rule is that Alberta is entitled to divert, store or consume a minimum of 2.1 million-acre feet in any year. The effect of this exception is that during years when the volume of natural flow is less than 4.2 million-acre feet (a rare occurrence), Alberta may pass less than one-half of the apportionable flow to Saskatchewan. If at any time during a year Alberta wants to divert, store or consume more than half the apportionable flow, a flow rate of 1,500 cubic feet per second (cfs) must be maintained at the Saskatchewan border, unless the natural flow is less than 3,000 cfs, in which case half the natural flow must be passed. (There is no policy in Alberta as to the amount of water each sub-basin of the SSRB must contribute to the Saskatchewan apportionment.)

Minimum Flow ~ The term used in the SSRB Water Allocation Regulation to stipulate the least amount of flow that must remain in the St. Mary, Belly, and Waterton rivers. For purposes of modeling, they are also referred to as Instream Objectives (IOs). These flows offer very limited protection of the aquatic environment.

Natural Flow ~ Natural flow is the flow in rivers that would have occurred in the absence of any man-made effects on, or regulation of, flow. For purposes of water management, natural flow is a calculated value based on the recorded flows of contributing rivers; a number of factors concerning the river reaches (e.g. evaporation, channel losses, etc.); and water diversions. This is also known as "re-constructed flow" and "naturalized flow".

Preliminary Certificates ~ An authorization issued by the Director to issue a licence if certain conditions are met.

Reservoir ~ A man-made structure which collects and stores water for future uses. During periods of low river flow, reservoirs can release additional flow if water is available.

Retrofit Provision ~ Water licenses issued in recent years contain a condition indicating that once a water conservation objective is established, the licence may be amended to include the objective. The licence holder would then not be permitted to withdraw water when river flow is less than the objective.

Riparian Area ~ The area along streams, lakes, and wetlands where water and land interact. These areas support plants and animals, and protect aquatic ecosystems by filtering out sediments and nutrients originating from upland areas.

Riparian Vegetation ~ The vegetation that exists in riparian areas and is supported by the interaction of the water and land.

River Basin ~ An area of land drained by a river and its associated streams or tributaries. Alberta's Water Act identifies seven major river basins within the province:

- Peace/Slave River Basin
- Athabasca River Basin
- North Saskatchewan River Basin
- South Saskatchewan River Basin
- Milk River Basin
- Beaver River Basin
- Hay River Basin

SSRB ~ South Saskatchewan River Basin. The South Saskatchewan River Basin includes the sub-basins of the Red Deer, Bow, and Oldman and the South Saskatchewan Rivers.

Southern Tributaries ~ This term refers to the St. Mary, Belly and Waterton rivers, which are also collectively referred to as the southern tributaries of the Oldman River.

Sub-basin ~ A part of a river basin drained by a tributary or having characteristics that are significantly different from other areas in the basin.

Surface Water ~ Refers to water bodies such as lakes, ponds, wetlands, rivers, and streams. It may also refer to sub-surface water with a direct and immediate hydrological connection to surface water (for example, a water in a well beside a river).

Voluntary Action ~ Performing an activity freely without compulsion.

WCO ~ Water Conservation Objective

WPAC ~ Watershed Planning and Advisory Council (see Water for Life: Alberta's Strategy for Sustainability). In the SSRB (at the time of writing this plan), WPAC's include the Bow River Basin Council and the Oldman Watershed Council. A WPAC is also being formed for the Red Deer River watershed.

Water Act ~ The purpose of Alberta's Water Act is to support and promote the conservation and management of water, including the wise allocation and use of water (s.2).

Water Allocation Transfer ~ A water allocation transfer occurs after the holder of an existing water licence agrees to provide all or part of the amount they are allocated to another person or organization. Alberta Environment must approve any transfer of this kind. When this occurs, the allocation is separated from the original land, and a new licence, with the seniority of the transferred allocation, is issued and attached to the new location. Under the Water Act, Alberta Environment can place conditions on the new licence. Water allocation transfers can occur only if authorized under an approved water management plan, or by the Lieutenant Governor in Council. See Sections 81,82 and 83 of the Water Act.

Water Conservation Holdback ~ If the Director is of the opinion that withholding water is in the public interest to protect the aquatic environment or to implement a Water Conservation Objective, and the ability to withhold water has been authorized in an applicable approved water management plan or order of the Lieutenant Governor in Council, the Director may withhold up to 10 per cent of an allocation of water under a licence that is being transferred. The withholding occurs at the time the new licence created for the transferred allocation is issued (section 82(2) of the Water Act).

Water Conservation Objective (WCO) ~ As defined in Alberta's Water Act, a Water Conservation Objective is the amount and quality of water necessary for the protection of a natural water body or its aquatic environment. It may also include water necessary to maintain a rate of flow or water level requirements.

From the Water Act: "Water Conservation Objective" means the amount and quality of water established by the Director under Part 2, based on information available to the Director, to be necessary for the

(i) protection of a natural water body or its aquatic environment, or any part of them,

(ii) protection of tourism, recreational, transportation or waste assimilation uses of water, or

(iii) management of fish or wildlife,

and may include water necessary for the rate of flow of water or water level requirements.

A licence can be issued by the Director to the Government of Alberta for the purpose of implementing a Water Conservation Objective.

Water Licence ~ A water licence provides the authority for diverting and using surface water or groundwater. The licence identifies the water source; the location of the diversion site; an amount of water to be diverted and used from that source; the priority of the "water right" established by the licence; and the condition under which the diversion and use must take place.

Water Management Plan ~ Alberta's Water Act and Framework for Water Management Planning outlines the process for water management planning and the components required for water management plans in the province.

Watershed ~ An area of land that catches precipitation and drains into a larger body of water such as a marsh, stream, river or lake.

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